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ABSTRACT

The development of information systems is described with regard to the roles of the system user and the data processing specialist. Institutional needs are best served by coordination efforts, usually handled by a management systems office, which is also responsible for the maintenance and production of an institutional data element dictionary and a uniform code manual. Consideration must be given to production processes dealing with data and files, and their management must report at a high enough level in the organization to accomplish coordinated development at the institutional level between various administrative information systems. A model for a user's group is presented. (LBH)

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PROGRAMME SUR LA GESTION
DES ÉTABLISSEMENTS D'ENSEIGNEMENT SUPÉRIEUR

ORGANIZING INFORMATION SYSTEMS

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ORGANIZING INFORMATION SYSTEMS

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ORGANIZING INFORMATION SYSTEMS

The acquisition of a large scale computer and the establishment of a administrative systems office will not automatically guarantee that an institution of higher education will reap the benefits of information systems technology. While adequate computer hardware and a competent systems department are certainly necessary, they are by no means the only ingredients required for the development of successful information systems.

Organizations, their roles, structures and attitudes are probably the most important consideration in the successful employment of information systems technology in higher education. This paper will discuss several of the major concepts relevant to organizing information systems.

ORGANIZATIONAL ROLES IN SYSTEM DESIGN AND USE

It is only recently that the word management has become acceptable in the field of higher education. Even today a preferable term is administration. This subtle semantic difference seems to imply that higher education administrators are significantly different from their commercial counterparts. This traditional collegeal environment must be understood if the implementation of information systems in higher education is to be successful.

The major roles in the development of information systems are played by the system user and the data processing specialist. Leon Albrecht states: "The responsibility for developing a systems design plan should rest with the head manager of the information systems division."[1] This statement is typical of the commercial approach to system development. Practical experience and observation indicates that in higher education, the system user must be intimately involved at the systems design stage. The very finest system design will encounter operational difficulties if it is forced upon the using department.

There is, of course, a price to be paid for the involvement of the system user at the design stage. Information systems technicians must communicate in language understandable to the user rather than in technical terms. In many cases, time must be spent educating the user in technical concepts. This price is often frustrating to the technicians, who wish to charge ahead with what they view as the solution to the user's problem. In a commercial environment the alternatives available to the user usually are to accept the technician's solution or make room for someone who will accept the solution.

In higher education the information systems developers are generally placed in a service role and must work with the user to solve his problem. Failure to operate in a cooperative mode can become expensive. Generally the technicians provide

successive solutions for a problem until they hit upon the solution the user had in mind, or the user accepts a solution that does not meet his needs.

Institutional needs in the area of information systems are best served by cooperative efforts between the system user and the data processing specialist. There is, however, need for coordination between the major systems. This role is generally assigned to a management systems office, an office of administrative studies or some other organizational unit reporting to a second level chief administrator. This office is charged with coordinating the development of operating information systems so that they both serve the needs of the user department and provide information for institutional analysis and planning. Usually this office is also responsible for the maintenance and production of an institutional data element dictionary and a uniform code manual.[2] The management systems office generally works with the other operating units of the institutional administration in a persuasive mode; however, occasionally it must be in a position to exert some control over system design when it is in the best interest of the institution to do so. Such control will generally be exercised through a second level chief administrator rather than directly over the operating department.

Additional organizational considerations occur in the information systems production processes. Data and files are considered to be "owned" by the major administrative

units and are only stored and processed by the administrative data processing unit. To put it another way, the administrative data processing department assists each operating administrator in accomplishing his mission; it does not accomplish it for him. As stated by Caffrey and Mosmann, "It is of upmost importance for the president to understand that the fact that automated processes are used, does not relieve the administrative staff members of any of their primary responsibility for the operational efficiency and effectiveness of the functions they perform. It is still they, not the computer center or its staff, who are responsible for running the college and its programs."[3]

Unfortunately many line administrators abdicate their responsibility for decisions over the functions of their office the moment their procedures are placed upon the computer. It is the nature of computer personnel that, given the opportunity to make decisions for other people, they readily do so. In such cases the technician then effectively <u>becomes</u> the line administrator.

If organizational roles are properly defined, the user department maintains control over data origination, production schedules and output distribution.

In the case of an administrative department that distributes reports to units throughout the institution, that administrative department should remain in the position of answering all questions about the computer output. Frequently the natural

reaction of recipients of reports is to call the computer center with any questions concerning a computer printed document. When this occurs, two mistakes are made. First, the computer department personnel may provide a wrong answer; and second, a new and erronous information flow path is established.

There are very simple techniques that can be employed to avoid this type of problem; for example, printing the telephone number of the appropriate administrative department on each page of a computer-produced report. Then, of course, the administrative department must answer questions rather than refer calls to the computer center, or no advantage has been gained.

INTERRELATED SYSTEMS

As mentioned earlier, there must be one office responsible for the coordination of the development of operational data systems. It is important that this office report to an administrative level that is at least equal to the reporting level of all of the major operational data system users. It is extremely important that the management systems office not report to any one of the major users. There are an abundance of examples in the United States to indicate that when the management systems function reports to any one of the major operational system users, then that system soon becomes over-developed at the expense of other operational data systems in the institution.

While the management systems office should report to a high level in the administration, it is still important that it operate in a coordinating mode, rather than dictating

systems solutions to the operational users. One organizational technique for providing coordination between the operational data systems users is the formation of a committee of the major administrative departments. In the United States these committees are called by various names, such as Administrative Systems Council, MIS Council, Committee on Institutional Data, Administrative Data Committee, and other similar titles. The structure and role of such a group is important if an institution is to achieve the appropriate interrelating of operational data systems to support management decisions.

For the prupose of illustration we shall call this group the Administrative Systems Council and first dicuss the membership of the group. Of course, the heads of all of the major administrative systems users should be members including the management systems office. In addition, representatives of each of the levels of management of the institution should be part of the group. All schools or colleges and departments will utilize information from the operational data systems. These offices are sometimes referred to as the "user's users" since they receive reports from the fiscal office, the registrar's office, and other administrative offices. Normally it is not required that representatives of all operational units at the "user's user" level serve on the committee. Perhaps this duty can be rotated among the heads of schools and colleges and heads of departments. The important point is to insure that all levels of management are represented on the Administrative Systems Council.

It should be clear from the outset that the role of the Administrative Systems Council is advisory concerning system development priorities and inter-system coordination. The committee should be chaired by an administrator one organizational level above all of the members of the committee. It also must be made clear that the committee is not constituted to provide for day-to-day supervision of computer activities.

The Administrative Systems Council should meet on a regular basis to review progress of systems under development and to advise the administration on the prioritization of new systems development needs. Proposals for the development of new administrative systems should be reviewed by this group. In addition to providing a more coordinated approach to system development, some spin-off benefits will accrue to the institution. The various administrative organizational units of the institution will acquire a better knowledge of the operation of other units and of the total administrative process. In addition, system designers and the user department staff will achieve a more professional status through the presentation of systems proposals to the Administrative Systems Council.

It is very important, however, that the Administrative Systems Council not be treated as, or operate as, a "rubber stamp" committee. The members and the committee must be viewed as a very important ingredient in the development process for information systems.

DATA PROCESSING ORGANIZATION

The first decision most institutions face relative to the organization of computer resources is centralization or decentralization of the major functions of academic computer support and administrative computer support. Controversy on this point continues in the United States with staunch advocates for both positions. Successful examples of both centralized and decentralized installations can be cited. In his recent book, Mr. Charles Mosmann said:

> "Because of the management costs of centralization and the technical costs of generality, many medium-to-large institutions with small research budgets accept some degree of decentralization. Separate facilities will be available for academic and administrative use; some mini-computers will be in use in various science departments; some users will occasionally buy remote computing from a commercial or regional center. The real function of the central organization is to foster good computing and not just to create an orderly situation. If apparent confusion and duplication promotes good research and good education, then multiple centers should obviously be encouraged. Yet by and large this is not often the case with multiple centers and competing services. Attempts to create order are generally attempts to improve the quality of computing and the quality of the research and education it serves.

At smaller institutions, of course, centralization may be a necessity. Financial resources may be simply insufficient to permit the dispersion of computing, while individuals or small groups of users may not have the independence to be able to override the interests of the majority. Thus at these institutions the job of coordinating computing is considerably easier, since almost all the users will agree that cooperation is to their own best interest."[4]

There is a perceptable trend in the United States towards the computer utility concept, where the operation of the computer hardware and its associated systems provide computing resources to all users. Separate organization units make this computing resource available to the academic and administrative users. Exhibit A shows a typical organization as presented by Mr. Mosmann[5]. In this hypothetical organization the director has six separate organizational units reporting to him. A more detailed description of this organizational chart is available in Mr. Mosmann's book.

Exhibit B provides another view of a typical computer center organization and Exhibit C shows further details for the system's development division. These charts were developed by Dr. Robert E. Taylor, Associate Director of the Computing Center at Virginia Polytechic Institute and State University.[6]

Whatever conceptual model is choosen for the organization of data processing there are four major functions to be performed:

1. Management
2. Systems Development and Programming
3. Operations
4. Production

The management of the data processing organization, as stated earlier, must report at a high enough level in the organization to accomplish coordinated development at the institutional level between various administrative information systems. While the director of the data processing organization must have the political capability to deal with other organizational units, he must also have adequate technical knowledge to insure that technical considerations do not over-ride the system development and production process. Unfortunately, many superior technicians are promoted to management positions, causing the institution to lose twice. First, they lose the services of a good technician, and second, they may acquire a poor manager. When faced with the task of hiring a new director for the data processing organization, institutional administrators would be well advised to obtain the services of other successful directors as consultants to assist at the interview stage.

The systems development and programming division of a data processing organization is normally divided along the functional lines of a financial systems unit, a student related systems unit and additional units to handle other major systems.

These units work with the user in the system defintion and design stages then follow on with the detailed system design, programming, documentation and implementation steps. The end-product of the development effort is a fully documented, tested and operational system turned over to a production section.

The operations unit of a data processing organization includes the computer hardware operation and systems programming; that is, the generalized software associated with computer scheduling, compiling and other tasks necessary to provide computer resources to each of the users. It should be noted that there is a considerable difference between the programmers who work on operating systems software and the programmers who work on application systems for using departments. Normally system programmers are highly skilled technicians who deal with the very detailed systems software, while applications programmers deal with much higher level languages and are more concerned with the user's viewpoint than with the technical process internal to the computer.

The production function in administrative data processing organizations is sometime designed as a part of the operations department and other times as a part of the user department. It may also be a separate unit of the data processing organization. The function, however, is to prepare the input for a particular administrative system, receive the output and verify its accuracy,

insure that the appropriate files were used and other activities related to quality control. The organizational placement of this function is not as important as the fact that it be performed by some unit. It is this unit that is charged with avoiding those disasters everyone hears about. For example, the scheduling of all students into a single classroom at a single hour, or the production of a grade report with all failing grades for all students.

Many models for organizational structures exist, however, the organizational structure for any institution is not as important as the people who fill it. The best structure will not work for incompetent employees and any structure will work for those who have competence.

ORGANIZATIONAL ATTITUDES

Successful information systems operations have in common some organizational attitudes that are worth examining. Each of the user organizations the admissions unit, the student records unit, or the accounting unit, should view their operation as a supporting unit to the institutional management team. If some organizational unit of the institution requires that additional data be collected in the admissions system then the admissions officer's attitude must be "if someone else requires this data, and the resources can be justified and made available, then my unit will be responsible for the collection and maintenance process." In many cases operational

managers in institutions of higher education are concerned only with collecting and maintaining the data necessary to perform what they view as their function. The formation of an administrative systems council, discussed earlier, can contribute to improved attitudes on the part of the operational managers in an institution.

It is important, also, that the data processing organization operate in a service mode. The allocation of the system development and computer production resources must be consistant with institutional priorities. As mentioned earlier, the best place for determining these institutional priorities is normally through an administrative systems council where representatives of all user groups can be heard. It is worth noting that resource allocation is not a problem if resources are unlimited. Procedures for resource allocation should exist, however, before unexpected limitations force an unorganized approach to prioritization of activities.

SUMMARY

In very few institutions of higher education has the top administrator devoted an adequate amount of attention to the organizing of information systems. While it should not be expected that administrators become qualified in the technical aspects of information systems, it is important that they be concerned about the control and management aspects. The

costs of a successful information systems operation are considerable. The costs of unsuccessful operations are even higher.

It has been the purpose of this presentation to acquaint the administrator with some of the factors involved in organizing information systems. The organizational roles in both system design and use were discussed. The inter-related systems concept and a model for a user's group were presented. The internal organization of the data processing organization was covered and the major functional responsibilities of that organization discussed. Finally, there was a discussion of the attitudes of both the user organization and the data processing organization.

To further develop awareness about organizing information systems, every administrator should be familiar with the activites of the National Center for Higher Education Management Systems at the Western Interstate Commission for Higher Education in Boulder, Colorado U.S.A. Also probably the best recent publication in this area is Academic Computers in Service by Mr. Charles Mosmann.[7] This book is a sequel to Computers on Campus by Mr. Mosmann and John Caffrey[8] and does an excellent job of summarizing the uses of computers in higher education including administrative applications.

EXHIBIT A

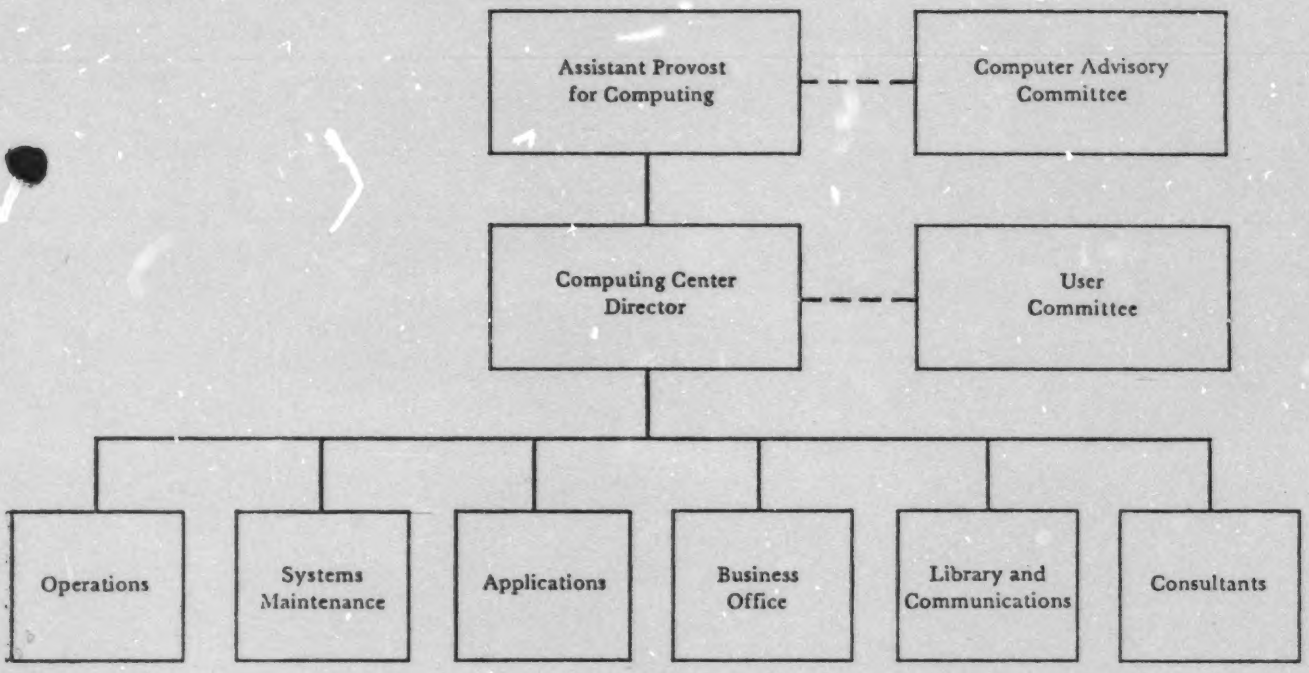
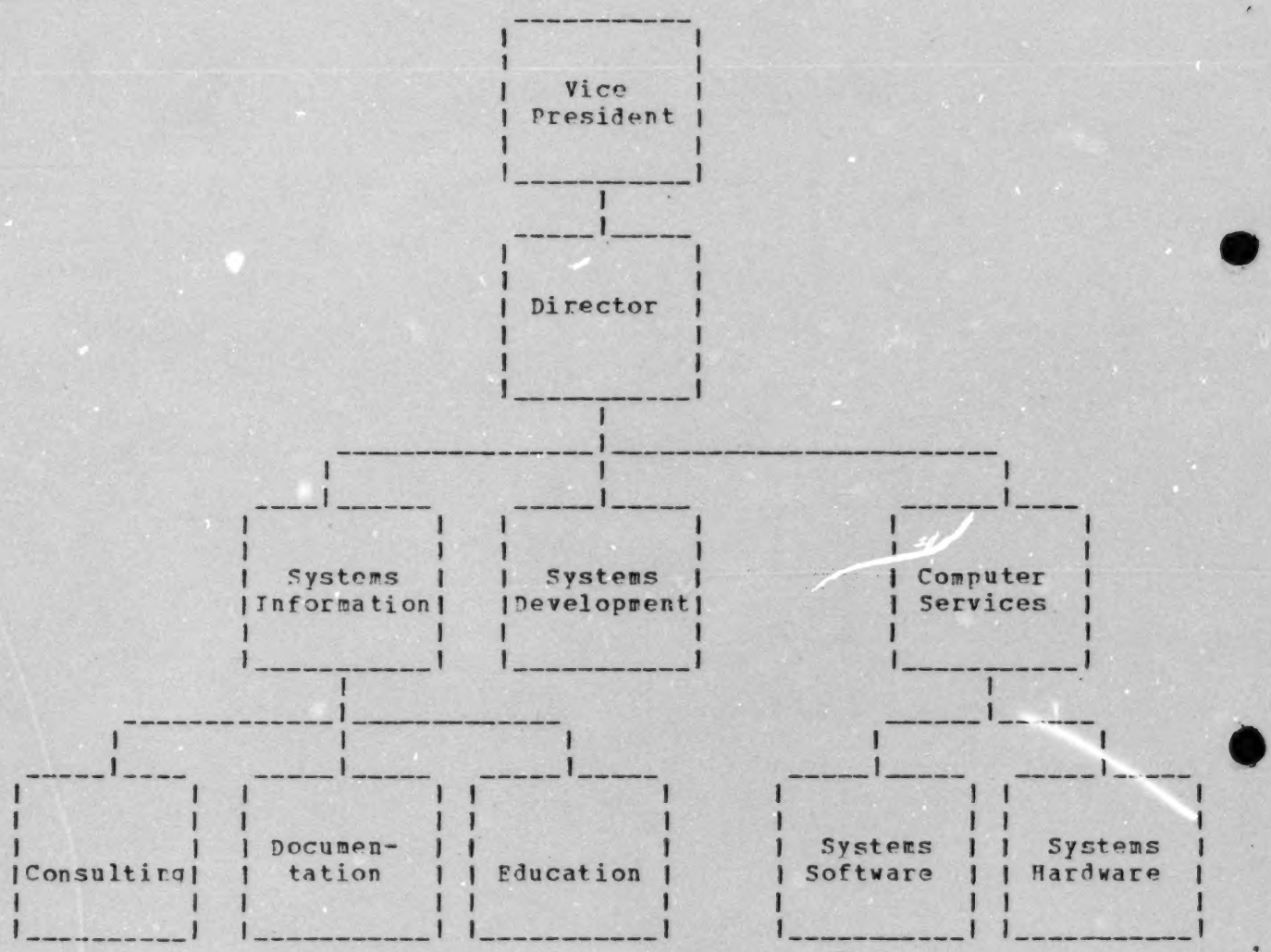
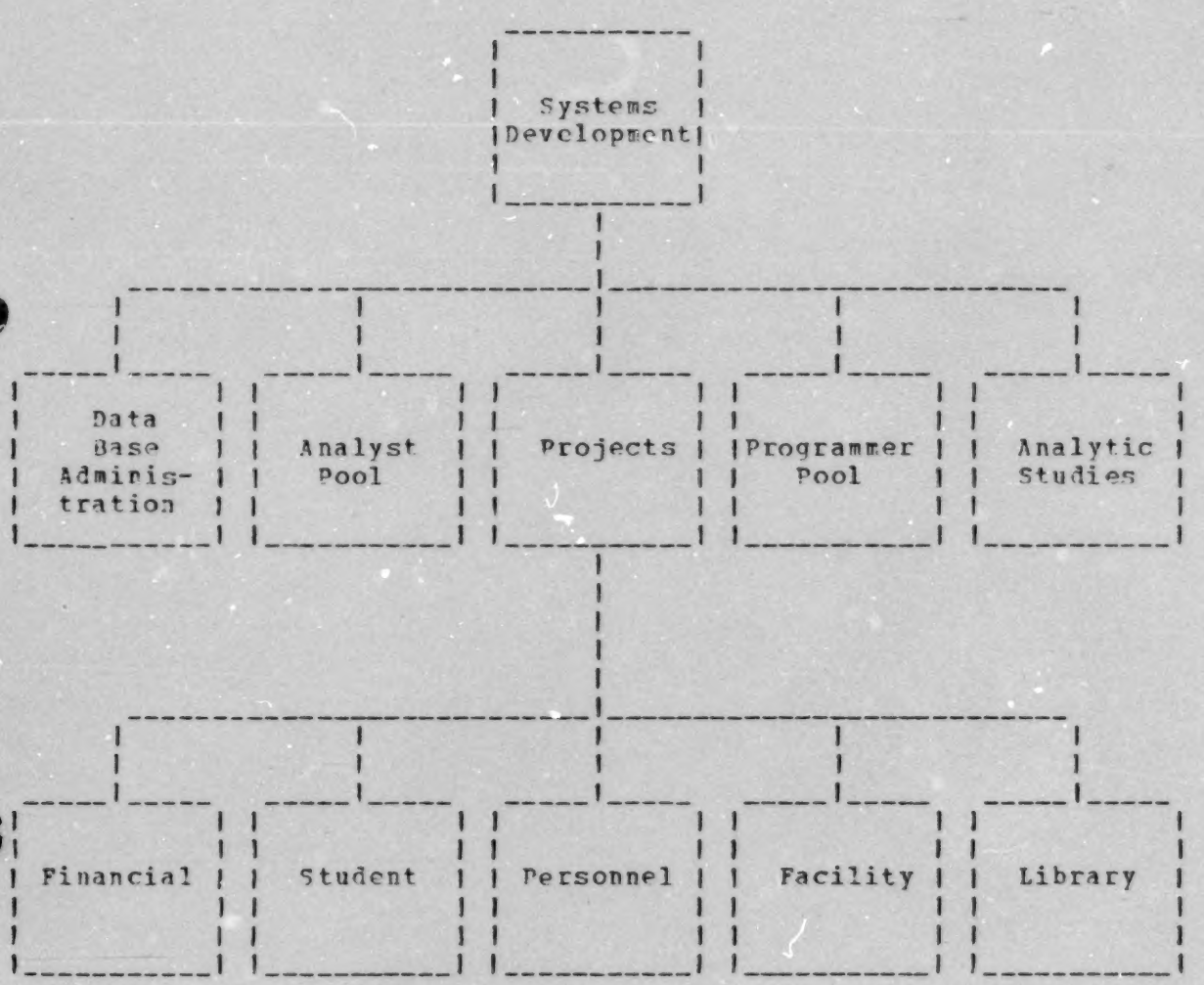

Assistant Provost for Computing
Computer Advisory Committee
Computing Center Director
User Committee
Operations
Systems Maintenance
Applications
Business Office
Library and Communications
Consultants

EXHIBIT B



A Typical Computing Center Organization Chart

EXHIBIT C



Systems Development Division

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2. Charles R. Thomas. "Data System Design." Prepared for Program on Institutional Management in Higher Education, sponsored by Organization for Economic Cooperation and Development, Paris, France, October 1-5, 1973.

3. John Caffrey and Charles Mosmann. Computers on Campus. Washington, D. C.: American Council on Education, 1967, p. 183.

4. Charles Mosmann. Academic Computers in Service. San Francisco: Jossey-Bass, Inc., 1973, p. 66.

5. Ibid., p. 71.

6. R. E. Taylor. "Developing Computer-Based Management Information Systems." Organizing for Innovation: Towards the Computer Utility. Conference Proceedings, Virginia Polytechnic Institute and State University, Blacksburg, Virginia, January 17-19, 1973, pp. 39-70.

7. Mosmann, op. cit.

8. Caffrey and Mosmann, op. cit.

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